REMARKS

Introduction

Applicants note with appreciation the Examiner's indication that claims 1-16 are allowable. Claims 1-18, 20 and 21 are pending in the application. Claim 19 has been previously canceled without prejudice or disclaimer. No new matter is being presented. In view of the following remarks, reconsideration and allowance of all the pending claims are requested.

Rejection under 35 USC §103

Claims 17, 18, 20 and 21 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Choi et al. "New Frame Rate Up-Conversion Using Bi-Directional Motion Estimation," I.E.E.E. Transactions on Consumer Electronics, Vol. 46, No. 3, (hereinafter, "Choi") in view of Heising et al., "Wavelet-based Very Low Bit Rate Video Coding Using Image Warping and Overlapped Block Motion Compensation" I.E.E.E. Proceedings: Vision, Image and Signal Processing, Vol. 148, No. 2, April 2001, (hereinafter, "Heising"). Applicants respectfully traverses these rejections for at least the following reasons.

Claim 17

Referring to independent claim 17, in the Office Action dated March 4, 2010, the Examiner alleges that Choi and Heising in combination with one another disclose all the limitations recited in independent claim 17. On page 4 of the Office Action, the Examiner acknowledges and Applicants agree that "Choi does not disclose a candidate interpolation pixel calculator to allocate a weight to the first and the second pixels according to relative locations where the first and the second pixels are to be interpolated." On pages 4-5 of the Office Action, the Examiner alleges that Heising discloses:

> a candidate interpolation pixel calculator to allocate a weight to the first and
> second pixels according to relative locations where the first and the second
> pixels are to be interpolated ... (Heising, refer to lines 15 to 21 of the left column,
> lines 29 to 34 and lines 35 and 36 of the right column in page 95, lines 12 to 18

of the right column in page 99, the first paragraph of the left column in page 100, Figure 2a, and formula 3 and 4).

However, it is respectfully submitted that Choi and Heising, whether taken alone or in combination with one another, fail to teach or suggest all of the features as recited in independent claim 17, for at least the following reasons.

Referring to page 95, lines 15 to 21 (left column), FIG. 2a, and formula 3 of Heising as relied upon by the Examiner, Heising describes that in "sequences with differently moving objects," warping prediction "is not capable of dealing properly with motion discontinuities at the object borders." In this case of "sequences" with "differently moving objects," Heising describes using "overlapped block motion compensation" in the blocks by "superimposing four predicted intensity values" that use "nonlinear weighting functions." Heising describes that the "four predicted values" for intensity that are used as "weighting functions" are "computed by employing the translational motion model" with "one of the four vectors" of the "four surrounding vertices for each prediction," and that "one bit is transmitted indicating the used prediction type." That is, Heising describes using "overlapped block motion compensation" in the blocks for "sequences with differently moving objects," by "superimposing four predicted intensity values" that use "nonlinear weighting functions" – not "calculating" a "candidate interpolation pixel" by "allocating" a "predetermined weight" to a "first interpolation pixel" and a "second interpolation pixel" according to "relative locations" where the "first and the second interpolation pixels" are "interpolated" among the "current blocks to be interpolated." Applicants submit that Heising describes that "intensity values" using "nonlinear weighting functions" are "superimposed" on blocks with "sequences with differently moving objects," not "calculat[ing]" a "candidate interpolation pixel" by "allocating a predetermined weight" to the "first and the second interpolation pixels" according to "relative locations" where the "first and the second interpolation pixels" are "interpolated." That is, Heising describes superimposing "intensity values" on blocks, not "calculat[ing]" a "candidate interpolation pixel" by "allocating a predetermined weight" to the "first and the second interpolation pixels."

Referring to page 95, lines 29-34 and 35-36 (right column), FIG. 2a, and formula 4 of Heising as relied upon by the Examiner, Heising describes that to "force the estimation of smooth vector fields" a "Langrangian multiplier" is "used to choose the best control point motion vector considering the prediction error" and the "location motion vector variance" between the

"candidate vector" and "eight motion vectors" of its "neighboring control points." Heising describes that the "decision whether to use warping prediction or OBMC for a block" is also based on formula 4. That is, Heising describes that a "Langrangian multiplier" is used to "choose the best control point motion vector" when considering the "prediction error" and the "location motion vector variance" between the "candidate vector" and "eight motion vectors" of its "neighboring control points," not "calculat[ing]" a "candidate interpolation pixel" by "allocating a predetermined weight" to the "first and the second interpolation pixels" according to "relative locations" where the "first and the second interpolation pixels" are "interpolated." Applicants submit that Heising describes "choos[ing] the best control point motion vector," not "calculat[ing]" a "candidate interpolation pixel."

Referring to page 99, lines 12 to 18 (right column) and page 100, first paragraph, of Heising as relied upon by the Examiner, Heising describes a comparison of prediction capabilities of "different motion models" (i.e.: "bilinear warping," "affine warping," "OBMC," and "BMC" -- "block motion compensation") by using a "Foreman sequence" such that the "last original frame" is used for "motion estimation and compensation." Heising describes that the "bilinear warping model performs best, followed by OBMC, affine warping and BMC." Heising describes that "using the proposed combination of bilinear warping and OMBC" the "prediction can be further improved," whereas "combining OBMC with BMC ... leads to worse predictions." That is, Heising describes an experiment to compare the prediction capabilities of "bilinear warping," "affine warping," "OBMC," and "BMC" using a "Foreman sequence" such that the "last original frame" is used for "motion estimation and compensation," not "calculating" a "candidate interpolation pixel" by "allocating" a "predetermined weight" to a "first interpolation pixel" and a "second interpolation pixel" according to "relative locations" where the "first and the second interpolation pixels" are "interpolated" among the "current blocks to be interpolated." Applicants submit that Heising describes that the "prediction can be further improved" by combining "bilinear warping and OMBC," not "calculat[ing]" a "candidate interpolation pixel" by "allocating a predetermined weight" to the "first and the second interpolation pixels."

Applicants respectfully submits that nowhere in the March 4, 2010 Office Action does the Examiner specifically set forth a prima facie case for a rejection under 35 U.S.C. 103(a) in connection with claim 17. The Examiner's burden in issuing a claim rejection is addressed by

37 CFR 1.104(c)(2), which recites, among other things, that

> [i]n rejecting claims for want of novelty or for obviousness, the examiner must cite the best references at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, **the particular part relied on must be designated as nearly as practicable. The pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified** (emphasis added).

See, also, M.P.E.P. § 706. In the March 4, 2010 Office Action, the Examiner has neither identified a particular part of Choi or Heising that is relied upon for the rejection of claim 1 that recites, among other things, "selecting areas of image blocks where block artifacts occur," "applying an overlap block motion compensation only to the selected areas," where "the areas of the image blocks are discontinuous areas between blocks." Applicants respectfully submit that the Examiner has not "designated" or identified the "particular part[s]" of either Choi or Heising that are "relied on" for the 35 U.S.C. 103(a) rejection of these features of claim 17, nor has the Examiner "clearly explained" the rejection of this claim. Applicants respectfully request reconsideration of claim 17 and withdrawal of this rejection.

Therefore, Choi and Heising, whether taken alone or in combination with one another, do not teach or suggest, among other things, "calculating a candidate interpolation pixel by allocating a predetermined weight to a first interpolation pixel and a second interpolation pixel according to relative locations where the first and the second interpolation pixels are interpolated among the current blocks to be interpolated," "selecting areas of image blocks where block artifacts occur," and "applying an overlap block motion compensation only to the selected areas" where "the areas of the image blocks are discontinuous areas between blocks" as recited in independent claim 17.

Since Choi and Heising, whether taken alone or in combination with one another, do not teach or suggest each of the features as recited in claim 17, claim 17 is patentably distinguishable and deemed to be allowable.

Accordingly, withdrawal of this rejection and allowance of this claim are earnestly solicited.

Claims 18, 20, and 21

With regard to claims 18, 20, and 21, it is requested that for at least the reasons that these claims depend from allowable independent claim 17, and therefore contain each of the features as recited in claim 17, claims 18, 20, and 21 are also patentable over <u>Choi</u> and <u>Heising</u>, whether taken alone or in combination with one another.

Accordingly, withdrawal of these rejections and allowance of these claims are earnestly solicited.

Examiner's Response to Arguments

On page 2 of the Office Action, the Examiner states that "Applicant's arguments with respect to claims 1, 9, and 17 have been considered." In the above remarks, Applicants address the Examiner's response to arguments recited on pages 2-3 of the Office Action, as well as the rejections recited on pages 3-7 of the Office Action.

Reconsideration of the pending claims in view of the above remarks is earnestly solicited.

Conclusion

It is respectfully submitted that a full and complete response has been made to the outstanding Office Action and, as such, there being no other objections or rejections, this application is in condition for allowance, and a notice to this effect is earnestly solicited.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided below.
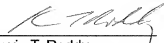
If any further fees are required in connection with the filing of this amendment, please charge the same to our Deposit Account No. 502827.

Respectfully submitted,

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